

**Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

(19) Japanese Patent Office (JP)

(11) Publication of an Application for Utility Model Registration

(12) **Publication of the Application for Utility Model Registration (U) Showa 60-22218 (1985)**

(51) Int. Cl.<sup>4</sup> Domestic classification symbol JPO file number (43) Publication February 15, 1985 (Showa 60)

B 23 C 5/22 6624-3C

B 23 C 5/10 6624-3C

Request for examination: Not requested yet (Total of pages)

(54) Name of the utility model THROWAWAY TIP  
(21) Utility model application Sho 58-112648 (1983)  
(22) Filed on July 20, 1983 (Showa 58)

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**Description**

**1. Title of the invention**

THROWAWAY TIP

**2. Claim of the utility model**

A positive-type throwaway tip, wherein one portion or all of the cutting blade, in which the upper surface and the side surface intersect each other, has a circular-arc shape blowing up toward outside with respect to the planar view thereof, which is characterized in that a flat side surface intersecting with a bottom face at right angles is formed at a lower part of a slanted side surface, and said vertical side surface is arranged along a vertical and flat seat wall of a tip seat formed in a body of a tool.

**3. Detailed description of the utility model**

(a) Field of invention

The present invention relates to an improved throwaway tip to be used with a ball end mill or a radius ball end mill.

(b) Conventional art and the problems

A throw away tip to be attached to the aforementioned rotary cutting tool has a circular-arc shaped cutting blade, and generally a positive-type tip, i.e., a tip with a side face intersecting the rake face at an acute angle, has been used to secure a good bite.

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Figures 1 and 2 show one example of the tip, whose original shape is approximately rectangular with respect to the planar view thereof; the curvilinear blade 2b having the continuous linear blade part 2a at the diagonal corners is formed and the side surface thereof is intersecting the rake face (top surface) at an acute angle and intersecting the bottom surface at an obtuse angle.

In the cutting tool to be used with the aforementioned tip, it is necessary to form a tip seat with a slanted seat wall having a circular-arc shape in the tool body 6 as shown in Figures 3 and 4; it is possible to form the seat wall 7 so as to have a similar shape as that of the side surface of the tip; however, it is extremely difficult to fabricate the seat so that the tip can be completely attached firmly to the seat; thus the fabricating cost will be high and there are many risks that the supporting state of the tip becomes unstable or the cutting precision becomes deteriorated.

**(c) Means to solve the problems**

To resolve the above-mentioned problems, the present invention is to provide a throwaway tip wherein a flat side surface intersecting with a bottom face at right angles

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is formed at a lower part of a slanted side surface, and said vertical side surface is arranged along a vertical and flat seat wall of a tip seat formed in a body of a tool. According to the present invention, since it is only necessary to form the seat in a tool in a linear flat face the fabrication of the tip seat can be simplified and the supporting state of the tip can be stabilized.

**(d) Embodiment of the invention**

Figures 5 to 7 show the improved example of the throw away tip as shown in Figure 1; the point-symmetric-shaped cutting blade 12 is formed at the bottom part of the slanted side surface 13 of the tip 11 consisting of the linear blade 12a and the curvilinear blade 12b continuing therefrom and the 2 pairs of flat side surfaces 13a, 13b orthogonal to the bottom face 15 that are intersecting each other at almost right angles with respect to the planar view thereof are formed at respective 2 diagonal positions. The side surfaces 13c, 13d connecting the side surfaces 13a and 13b at opposing diagonal positions respectively are also formed so as to be flat and orthogonal to the bottom face; however, these side surfaces may be omitted. That is to say, at these sites, the slanted side surfaces may be extended as they are to the bottom face.

The tip 11 having the above-mentioned configuration, may be attached firmly to

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the body of the tool as shown in Figures 8 and 9 by such a manner that a tip seat comprising a seat face 17 to which the bottom face of the tip is firmly attached and straight seat walls 18, 19 which is orthogonal to the seat face and to constrain the flat side surface 13a, 13b of the tip is formed and the tip is attached thereto by a screw and the like.

Figures 10 and 11 show an improved example of a tip 12' wherein all cutting blades have circular-arc shapes and the lines connecting neighboring apexes form an equilateral triangle. There is also formed the flat side surface 13a' orthogonal to the bottom face 15' at the bottom part of the slanted side surface 13' in the tip 11'. The side surface 13' is configured so as to be firmly attached to the vertical seat walls 18'. 19' contained in the tip seat of the cutter body 16 as shown in Figure 12.

Meanwhile, in tips wherein lines connecting the apexes form an equilateral triangle or other regular polygons, it is better to make the flat side surface parallel to the line connecting the apexes. However, this invention may be applied to any positive-type polygonal tip having the part or all of cutting blades are circular-arc-shaped; if the flat side surface is made parallel to the line connecting the apexes in a diamond-shaped

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or a parallelogram-shaped tip, the crossing angle of the side surface may be 50 degrees or less depending on the acute-angled corners of the tip; thus the strength of the tip may be deteriorated. Therefore, it is preferred for a flat side surface provided with a corner part having a crossing angle of 50 degrees or less to have a crossing angle of more than 50 degrees while ignoring the parallelism against the line connecting the apexes.

(e) Effect of the invention

As described above, according to the present invention, since the throwaway tip wherein a flat side surface intersecting with a bottom face at right angles is formed at the bottom part of the slanted side surface and the flat surface is configured so as to be firmly attached to the vertical seat wall in the tool body, the supporting state of the tip can be stabilized.

Furthermore, since the seat wall is linear, the fabrication thereof can be simplified and the accuracy can be also highly enhanced; thus the positioning accuracy of the tip can be also enhanced and the fabricating cost of the body can be reduced.

4. Brief description of drawings

Figure 1 shows one example of a conventional tip which can be the subject of the improvement, Figure 2 shows the side elevation of the conventional tip shown in Figure 1, Figure 3 is an elevation view of a tool to which the conventional tip is attached, Figure 4 is a sectional side elevation of the tool,

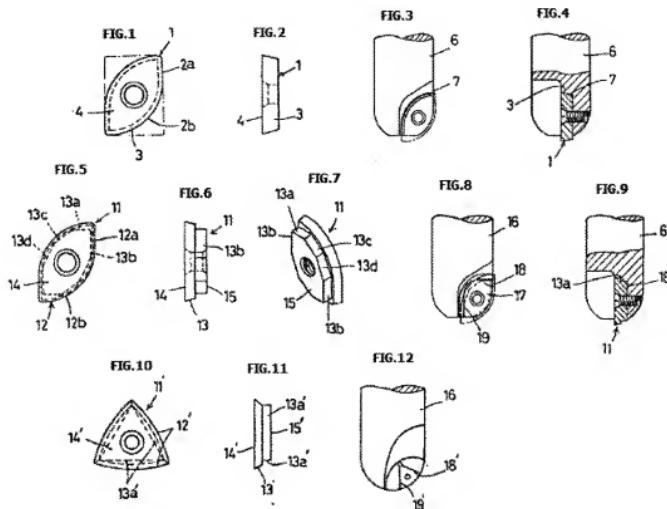
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Figure 5 is a plain view of one embodiment of the tip according to the present invention, Figure 6 is the side elevation of the tip, Figure 7 is a perspective view of the tip as seen from the bottom face side, Figure 8 is an elevation view of a tool to which the tip of the present invention is attached, Figure 9 is the partial side elevation of Figure 8, Figure 10 is an elevation view of another embodiment of the tip according to the present invention, Figure 11 is the side elevation of Figure 10, and Figure 12 is an elevation view of another embodiment of the tool.

11,11'—throwaway tip, 12—cutting blade, 12a—linear blade,  
12b—curvilinear blade, 13—side surface, 13a, 13a', 13b, 13b'—flat side surface, 14,  
14'—rake face, 15, 15'—bottom face

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October 15, 2010

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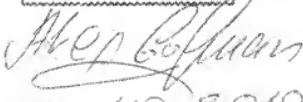
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Professional Translator



  
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明細書

2 実用新案登録請求の範

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上面と側面との交差する切刃部の一端又は全周を平面視において外側に膨らむ円弧状としたボルティプ型のスローアウエイチップにおいて、傾斜した側面の下部に底面に対して直角に交わる平坦な側面を形成し、この垂面の側面を工具本体に形成したチップ取付座の裏面かつ平坦な底壁に沿わせるようにしたスローアウエイチップ。

4) 地上上の利用分

本考案は、主としてボールエンドミル又はラジアスボールエンドミルを使用するスローアウエイチソップの改良に関するもの。

(b) 従来技術とその問題点  
昔記の如き回転制剝工具に取付けのスローラ  
ウエイチップは、円錐状の切刃を有し、また、良  
好な切味確保のため、通常、ボジティップタイプの

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ものあくまで斜面に対して鋭角に交わる側面をもつものが使用される。第1図及び第2図はその一例を示すもので、原形の平面機が略々長方形をなすチップ1の対角コーナ部に直線刃2aの運搬する曲線刃2bが形成され、さらにその側面3はすくい面(上面)4に鋭角に、並面5に钝角に交差している。

このようなスローアウエイチップを使用する切削工具においては、チップの側面支持のため、第3図及び第4図に示す如き工具本体6に、円弧状の傾斜した座脱7を有するチップ取付座を形成する必要がある、座脱7は、チップの側面に近似した形状にすることは可能であっても、チップが完全に密着するよう加工することは極めて難しく、従つて、工具の加工費が高くなき、しかもチップの支持状態が不安定になつたり、刃先精度に注いを生じたりすることが多い。

(4) 問題点を解決するための手段

本考案は、かかる問題を解消するべく、スローアウエイチップの傾斜側面の下部に底面に対し

て底角に交わる平坦な側面を形成し、この垂直な側面を工具本体に形成したチップ取付座の垂直かつ平坦な底壁に沿わせるようにしたものであり、これによれば、工具側の底壁を直線状の平坦面とすればよいのでチップ取付座の加工が容易になり、かつチップの支持状態も安定させることができる。

#### (5) 実施例

第5図乃至第7図は、第1図に示すスローアウエイチップの改善例を示すもので、点対称形状の切刃12が直線刃12aとそれに連なる曲線刃12bから成るチップ1の傾斜した側面13の下部に、底面15に対し底角に交わる平坦な側面13a・13bが平面機においては、底角に交差して対角位置に2箇所発形成されている。対角位置の側面13aと13bとをつなぐ側面13c、13dも底面と底角な平面面とされているが、この側面は省略することができる。即ち、この部位では傾斜した側面をそのまま底面底面延長しておいてよい。

以上の構成としたチップ1は、第8図及び第9

(2)

(3)

9 図に示すような工具本体 16 に、チップの底面を密着させる座面 17 と、この面に対し直角でチップの平坦な側面 13a、13b を拘束するストレートな底盤 18、19 とを備えるチップ取付座面を形成して、そこにねじ等を利用して固定すればよい。

第 10 図及び第 11 図は、切刃 12' が全て円弧で構成する頂点を結ぶ線が正三角形をなすチップの改善例を示している。このチップ 11' も、傾斜した側面 13' の下部に底面 15' と直角で平坦な側面 13a' が形成されており、この側面 13a' を、第 12 図に示すように、カッタ本体 16 のチップ取付座面に含まれる直角な底盤 18'、19' に密着させるようにしてある。

なお、頂点を結ぶ線が正三角形ではないそれ以外の正多角形をなすチップの場合、平坦な側面はチップの頂点を結ぶ線と平行にしておくのがよい。

尤も、本考案は切刃の一又は全体が円弧状となるボルティップ型多角形チップの全てに適用され、差形チップや平行四辺形チップにおいて平坦な側面を頂点を結ぶ線と平行にすると、チップの底角

面を側面と平行にすると、チップの底角コーナの角度が 50° 以下となつてチップ強度を低下させことがあるので、交角が 50° 以下のコーナ部に設ける平坦な側面は、頂角を結ぶ線との平行度を無視して交角を 50° 以上とするのが望ましい。

#### 4. 効果

以上説明したように、本考案のスローアウェイチップは、傾斜した側面の下部に、平坦で底面に対し直角な側面を形成し、それを工具本体の直角な底盤に密着して沿わせるようにしたので、チップの支持状態が安定する。

また、工具本体側のチップ取付座の加工も底盤が直線状であるので容易であり、しかもその座は高精度に加工できるのでチップの位置決め精度も向上し、本体の加工費の面でも有利となる。

#### 4. 図面の簡単な説明

第 1 図は本考案の改良対象となる従来チップの一例を示す平面図、第 2 図はその側面図、第 3 図は、上記のチップを装着する工具の正面図、第 4

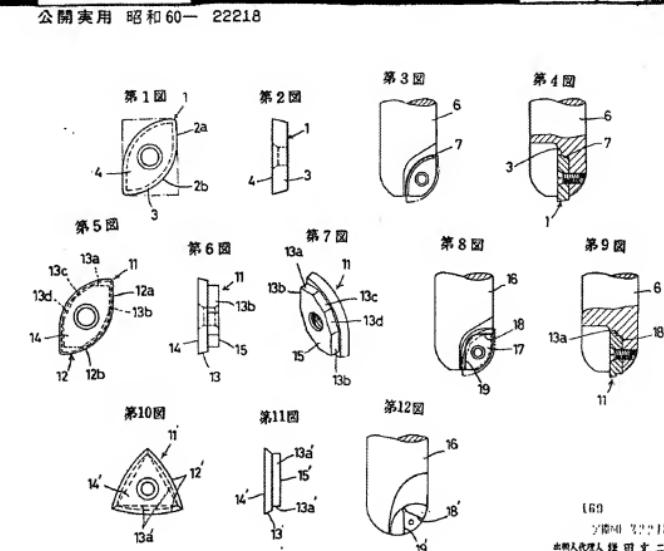


図はその一部破断側面図、第5図は本考案チップの一例を示す平面図、第6図はその側面図、第7図は底面側から見た斜視図、第8図は本考案のチップを装着する工具の正面図、第9図はその一部破断側面図、第10図はチップの他の例を示す平面図、第11図はその側面図、第12図は工具の他の例を示す正面図である。

11, 11' ... チップ、12 ... 切刃、12a ... 直線刃、12b ... 曲線刃、13 ... 側面、13a, 13a' ... 平坦な側面、13b, 13b' ... 曲がり面、14, 14' ... 平面。

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